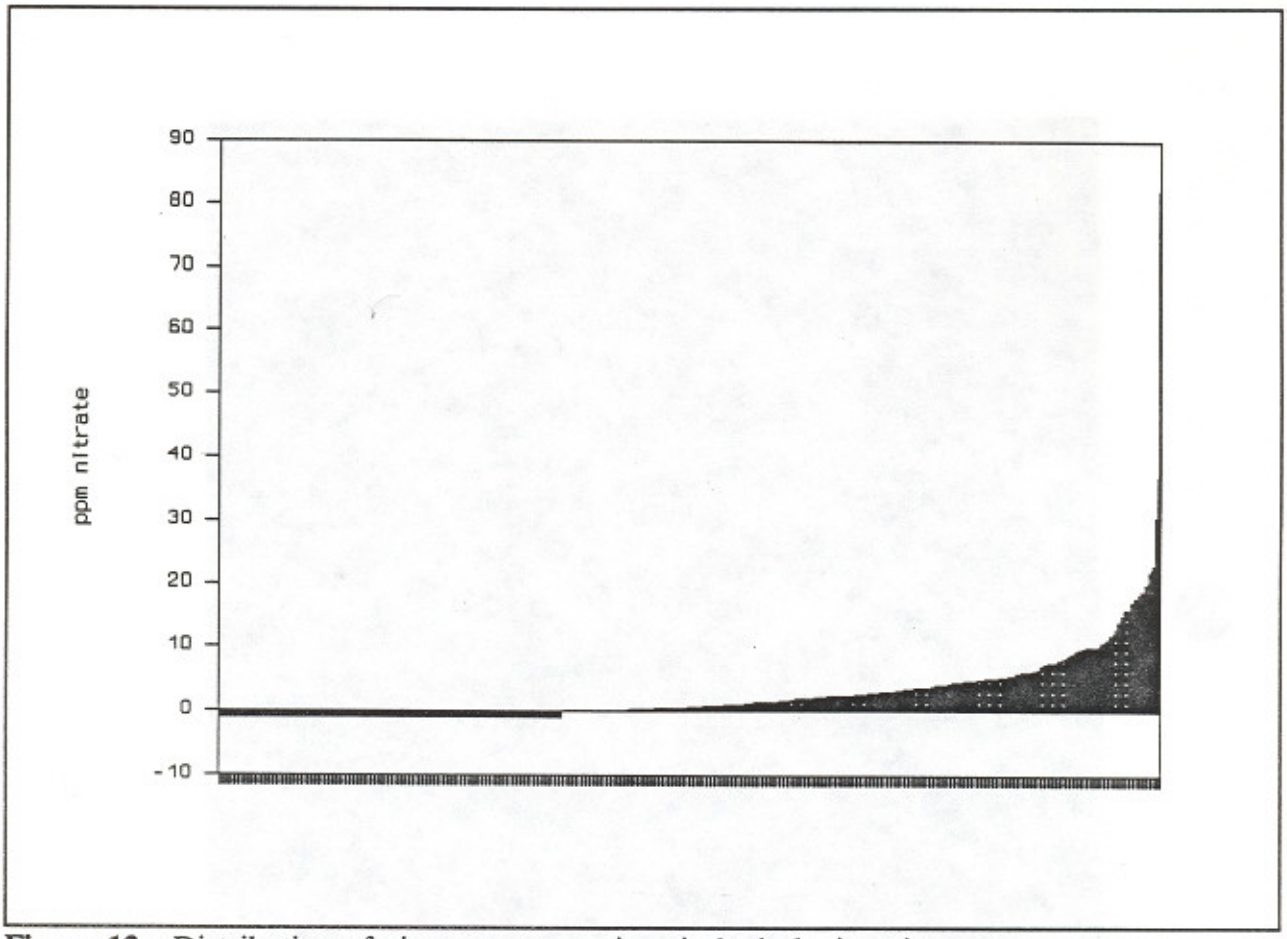

Figure 12. Distribution of nitrate concentrations in hydrologic unit.

vulnerability mapping is a valid tool for selecting areas that may be suitable for implementing nonpoint source pollution control mechanisms. Out of a data base consisting of 451 samples, only one of the samples that had nitrate concentrations above 10 mg/ℓ was located within low and moderate vulnerability rated areas.

Conclusions

From the results generated by this study of the pesticide, nitrate, and vulnerability data, the critical areas of the non-point source pollution of ground water within or proximal to the hydrologic unit are located in the western portion of the lower Payette River valley, most of the portion of Canyon County that is within the hydrologic unit, and the Sunnyside area, south of Weiser. The western portion of the lower Payette River valley's ground water has pesticide contamination. Greater than 20 percent of the wells in this area are above 5 mg/ℓ nitrate, and the area has been shown to be very vulnerable to ground water contamination. The area exhibits extensive agricultural activities. Ground water quality impacts from intensive crop production provides a likely

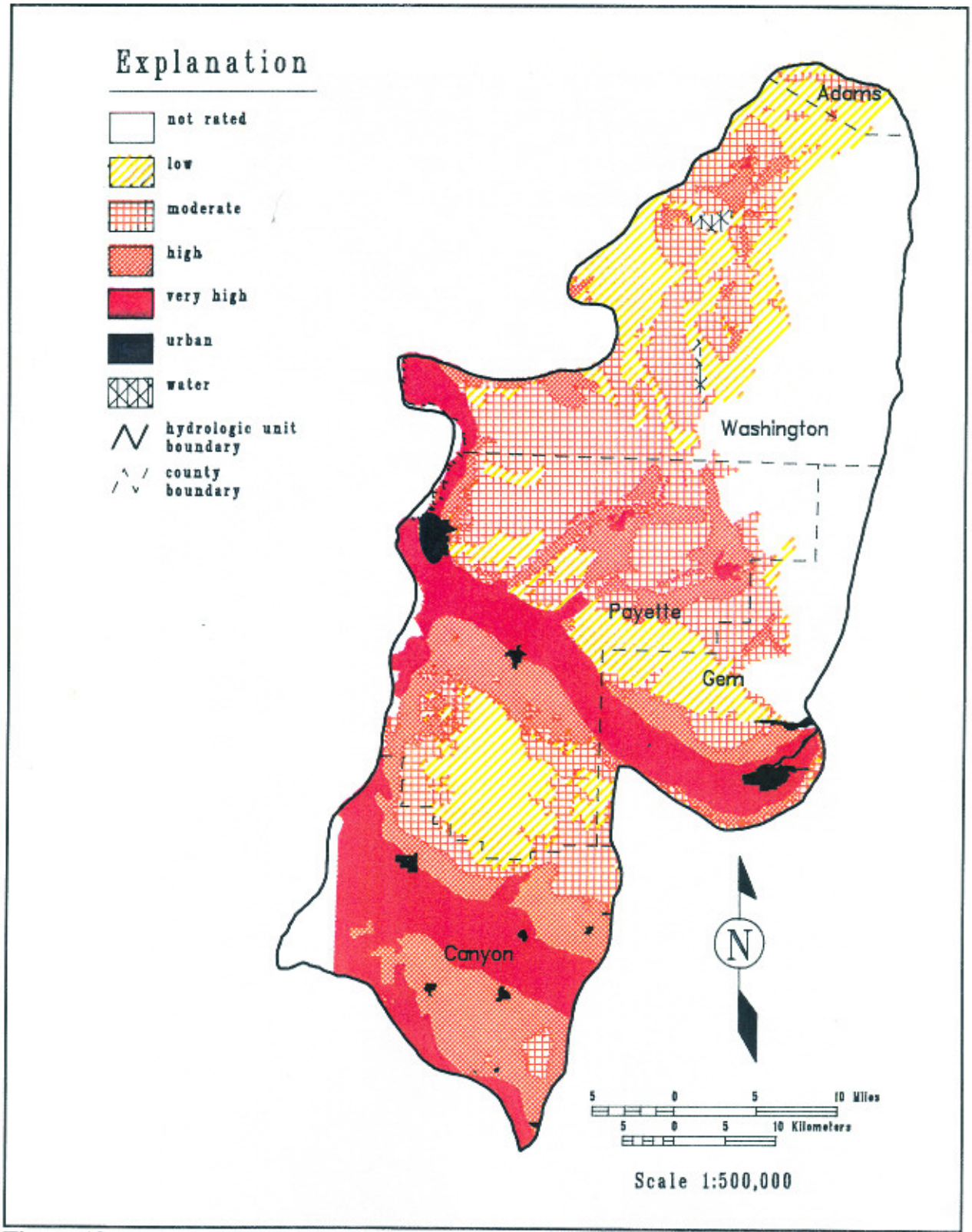

Figure 13. Ground water vulnerability of the hydrologic unit. (Rupert et al., 1991)

source for these nutrients and pesticides. The western portion of the lower Payette River valley is roughly defined as all of the lower Payette River valley west of New Plymouth and all of the lower Payette River valley north of New Plymouth.

Canyon County lacks the dense data coverage of the western portion of the lower Payette River valley. However, the limited nitrate concentrations exhibit an adverse trend. The vulnerability mapping project (Rupert et. al. 1991) substantiates this concern, as the area has a very high vulnerability rating.

Proximal to the hydrologic unit, Weiser Flats has an adverse trend in nitrate concentrations and pesticide detections. The entire Weiser River valley also may have high concentrations of nutrients and a high number of pesticide detections. This area requires additional investigation to fully characterize the ground water quality conditions.

Figure 14 illustrates the critical ground water quality areas within the hydrologic unit. These critical areas have been impacted by nutrients and/or pesticides. Because of the intensive and extensive fertilizer and chemical use in the project area and the relative inefficiency of irrigation application, agricultural chemical are likely a major source of contamination. These critical areas are also areas that will be used to develop nonpoint source pollution control mechanisms.

The major critical areas within the hydrologic unit are the western portion of the lower Payette River valley, the Sunnyside area south of Weiser, and the portion of Canyon County that is within the hydrologic unit. Another critical area proximal to the hydrologic unit that needs more investigation and evaluation is the area between the Weiser River valley and Weiser Flats.

The hydrologic unit needs a comprehensive pesticide monitoring project to evaluate pesticide contamination. Several pesticide studies within the hydrologic unit have revealed frequent detections of pesticides, especially the herbicide Dacthal. Since Dacthal was frequently detected and is widely used within the hydrologic unit in areas where furrow irrigation is common with low irrigation efficiencies, it is likely not being managed in the crop root zone. Contrary to the *Another Look: National Survey of Pesticides In Drinking Water Wells* (EPA, 1992), areas in Idaho have serious problems with pesticide management in crop root zones.

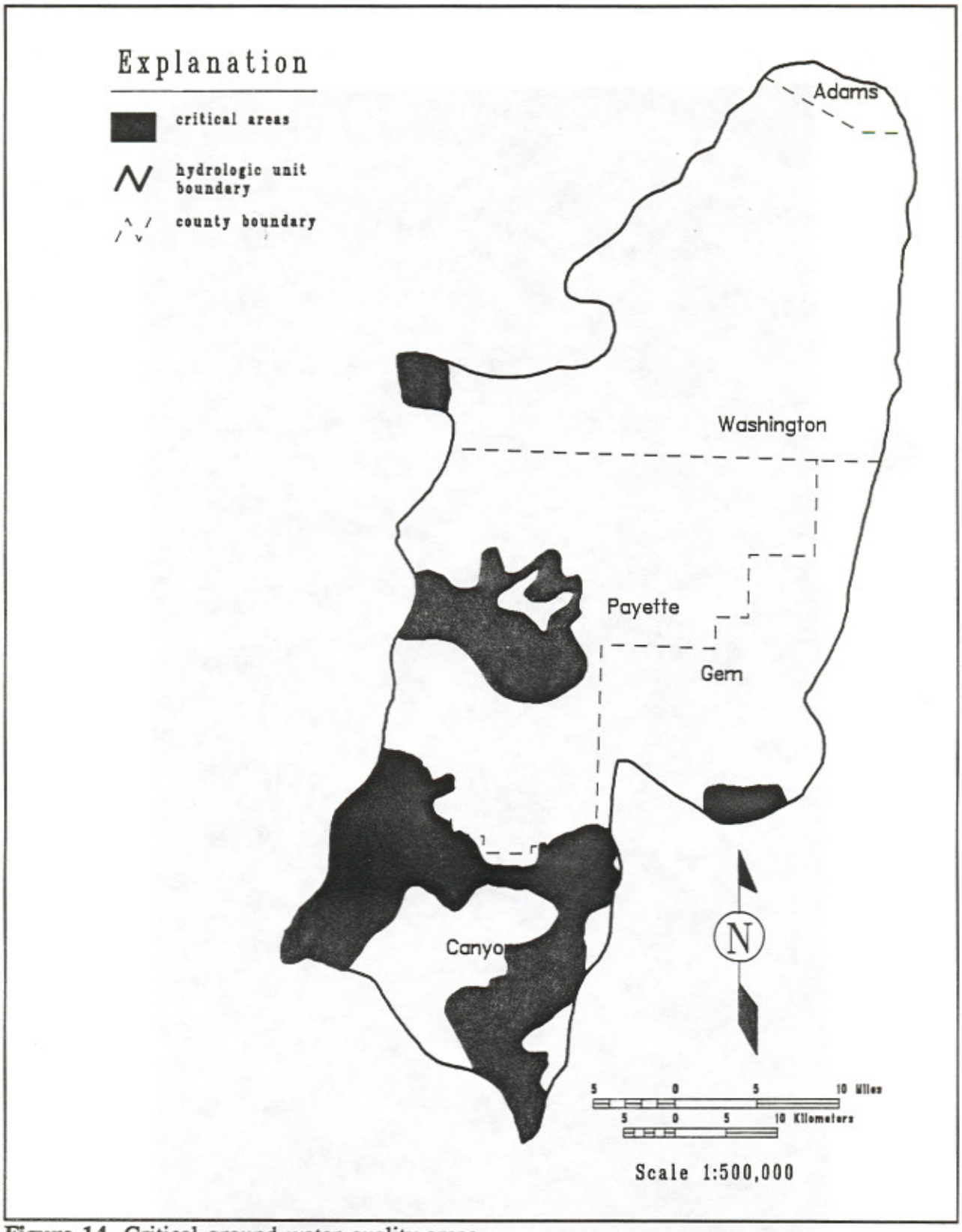

Figure 14. Critical ground water quality areas.

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Selected References

Aller, L., Bennett, T., Lehr, J.H., and Petty, R.J. 1985. *DRASTIC-A standardized system for evaluating ground water pollution potential using hydrogeologic settings.* Robert S. Kerr Environmental Research laboratory, Office of Research and Development, U.S. Environmental Protection Agency. EPA/600/2-85/018. 163 p.

Baldwin, J.A. and Wicherski, B. in prep. *Ground-Water and Soils Reconnaissance of the Lower Payette Area, Payette County, Idaho.* Idaho Department of Health and Welfare, Division of Environmental Quality.

Baldwin, J.A. and Wicherski, B. unpublished. *Weiser Area Ground Water and Soils Monitoring Study.* Idaho Department of Health and Welfare, Division of Environmental Quality.

Caicco, S. L., and Ciscell, M., in press. *Actual vegetation map of Idaho.* unpublished map manuscript, Idaho Department of Water Resources.

United States Environmental Protection Agency. 1992. *Another Look: National Survey Of Pesticides In Drinking Water Wells.* EPA 570/9-91-020. 165 p.

Idaho Division of Environmental Quality. unpublished. *Ground Water Quality Investigation in the Vicinity of Fruitland, Idaho.*

Idaho Division of Environmental Quality. 1988. *Idaho Water Quality Status Report and Nonpoint Source Assessment.* Idaho Department of Health and Welfare, Division of Environmental Quality, Water Quality Bureau. 170 p.

Idaho Division of Environmental Quality. 1992. *Idaho Ground Water Quality Plan, Protecting Ground Water Quality in Idaho.* Idaho Department of Health and Welfare, Division of Environmental Quality. 108 p.

Idaho Farm Bureau Federation, and Idaho Division of Environmental Quality. 1991. *Reconnaissance Ground Water Quality Survey, Canyon County, Idaho.* Idaho Department of Health and Welfare, Division of Environmental Quality. Unpublished Data.

Idaho Farm Bureau Federation, and Idaho Division of Environmental Quality. 1991. *Reconnaissance Ground Water Quality Survey, Gem and Payette Counties, Idaho.* Idaho Department of Health and Welfare, Division of Environmental Quality. Unpublished Data.

Idaho Geological Survey. 1978. *1:500,000 Geological Map of Idaho.* University of Idaho, Moscow, Idaho.

Idaho Snake-Payette Rivers Hydrologic Unit Planning Project (a). March 1991. *FY 1991 Plan of Operations.* 11 p.

Idaho Snake-Payette Rivers Hydrologic Unit Planning Project (b). March 1991. *FY 1991 Plan of Work.* 47 p.

Malde, H.E. 1965. Snake River Plain, in H.E. Wright, Jr. and D.G. Frey. *The quaternary of the United States.* Princeton University Press. pp. 255-263.

Mahler, R.L., Porter, E., Taylor, R. *Nitrate and Groundwater.* University of Idaho, Cooperative Extension System Agricultural Experiment Station. Current Information Series N. 872. 2 p.

Mahler, R.L. 1991. *Idaho Snake-Payette Rivers, USDA Water Quality Hydrologic Unit Project.* brochure. University of Idaho. Moscow, Idaho. WQ-4

NOAA (National Oceanic and Atmospheric Administration). 1990. *Climatological Data Annual Summary, Idaho.* Volume 93, Number 13. 31 p.

Rupert, M., Dace, T., Maupin, M., and Wicherski, B. 1991. *Ground Water Vulnerability Assessment, Snake River Plain, Southern Idaho.* Idaho Dept. of Health and Welfare, Division of Environmental Quality. 25 p.

Shapiro, M. 1991. computer software. *GRASS 4.0 Reference Manual.* U.S. Army Construction Engineering Research Laboratory. pp. 355.

Soil Conservation Service. 1972. *Soil Survey of Canyon Area, Idaho.* United States Department of Agriculture Soil Conservation Service in Cooperation with University of Idaho College of Agriculture, Idaho Agricultural Experimental Station. 126 p.

Soil Conservation Service. 1976. *Soil Survey of Payette County, Idaho.* United States Department of Agriculture Soil Conservation Service in Cooperation with University of Idaho College of Agriculture, Idaho Agricultural Experimental Station. 97 p.

Soil Conservation Service. *Soil Survey of Adams County and Washington County, Idaho.* United States Department of Agriculture Soil Conservation Service in Cooperation with University of Idaho College of Agriculture, Idaho Agricultural Experimental Station. Unpublished.

Stieber, T.D., Stack J.J., and Hutchison, N. 1992. *Idaho Snake-Payette Rivers USDA Water Quality Project Cropping Practices Survey*. United States Department of Agriculture, Agricultural Stabilization and Conservation Service, Soil Conservation Service, and University of Idaho Cooperative Extension System.

United States Geological Survey, Water Resources Division. *WATSTORE* (data base). Ground water information and water quality information for the hydrologic unit area.

Glossary of Terms and Acronym List

2,4-D: Pesticide. Action: Selective hormone-type herbicide. Use: For grasses, wheat, barley, oats, rangeland pasture, asparagus, corn.

Alluvial: A general term for detrital deposits made by streams on river beds, flood plains, and alluvial fans.

Background: Natural background ground water quality; The ground water quality unaffected by man. (IDEQ, 1992)

Basalt: A dark-colored igneous rock, commonly extrusive, composed primarily of calcic plagioclase and pyroxene minerals.

BDL: Below detection limit, for nitrate BDL is usually less than 0.005 mg/ℓ

Dacthal: Pesticide. Action: selective herbicide. Use: pre-emergence for smooth/hairy crabgrass, witchgrass, green/yellow foxtails, fall panicum, other annual grasses; broad leaf weeds.

Dacthal acid metabolite: a breakdown product of dacthal

Diazinon: Pesticide. Action: Insecticide, nematicide. Use: For soil insects and pests of fruits, vegetables, field crops, range, pasture.

Duripan: A horizon in a soil characterized by cementation by silica. Duripans occur mainly in areas of volcanism that have arid climates.

Eolian: Pertaining to the wind

EPA: United States Environmental Protection Agency

Fluvial: Produced by the action of a stream or river

GIS: Geographic Information System

IDEQ: Division of Environmental Quality, State, A division of Idaho Department of Health and Welfare

IDWR: Idaho Department of Water Resources.

IFBF: Idaho Farm Bureau Federation

IFBF/RGWQS: Idaho Farm Bureau Federation Reconnaissance Ground Water Quality Surveys

ISPRHUPP: Idaho Snake-Payette Rivers Hydrologic Unit Planning Project

Lacustrine: Pertaining to, produced by, or inhabiting a lake.

Loam: A rich, permeable soil composed of a mixture of clay, silt, sand, and organic material.

MCL: maximum contaminant level, maximum permissible level of contaminant in water delivered to any user of a public water system. MCLs are enforceable and federally determined standards.

Metribuzin: Pesticide. Action: Herbicide. Use: Controls a large number of grass and broad-leaf weeds infesting agricultural crops.

Miocene: An epoch of the early Tertiary period, after the Oligocene and before the Pliocene.

$\mu g/\ell$: micrograms per liter, equivalent to parts per billion (ppb)

mg/ℓ: milligrams per liter, equivalent to parts per million (ppm)

N: Nitrogen

Nitrate-N, or NO_3-N: Nitrate as nitrogen. This concentration unit is one of the most commonly used forms of detection.

NOAA: National Oceanic and Atmospheric Administration

Nonpoint Source (ground water): A potential source of ground water contamination that is diffuse and maybe intermittent. The cumulative effect of a high density of nonpoint sources results in ground water contamination.

Normal Fault: A fault in which the hanging has moved downward relative to the footwall. The angle of dip is usually 45-90°.

NO_2: Nitrite

NO_3: Nitrate

Nutrient: Any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater but is also applied to other essential and trace elements.

ODEQ: Oregon Department of Environmental Quality.

OSHD: Oregon State Health Department.

Pentachlorophenol (PCP): Biocide, Currently: Wood preservative, molluscicide. Historically, many different agricultural uses. PCP was the 2nd. most heavily used pesticide in 60's and 70's, and commonly used in the 80's.

Pesticide: Substance or mixture of substances intended for preventing, destroying, repelling , or mitigating any pest (insecticides, herbicides, fungicides, and others). Also substance intended as a plant regulator, defoliant, or desiccant. Pesticides can accumulate in the food chain/or contaminate the environment if misused.

Pleistocene: An epoch of the Quaternary period, after the Pliocene of the Tertiary and before the Holocene, ice age, glacial epoch

Pliocene: An epoch of the Tertiary period, after the Miocene and before the Pleistocene.

Point Source (ground water): A source of ground water contamination such as a surface spill, leaking underground tanks, or landfill that has an identifiable point of release and some impact on the aquifer.

ppb: parts per billion, equivalent to $\mu g/\ell$

ppm: parts per million, equivalent to mg/ℓ

Quaternary: The second period of the Cenozoic era, following Tertiary.

QA/QC: Quality Assurance/Quality Control

Semiarid: A type of climate (25-50 cm of precipitation) in which there is slightly more precipitation than an arid climate, and in which sparse grasses are the characteristic vegetation.

USGS/WRD: United States Geologic Survey, Water Resources Division

USDA: United States Department of Agriculture.

USDA/SCS: USDA Soil Conservation Service

WATSTORE: USGS/WRD water data base